SGP10xxS series
Direct Digital Synthesis (DDS)
Signal Generator

Users Manual

Rev1.1

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Thank you for purchasing our products, please carefully read the contents of the use's manual before use, to ensure the normal use of the instrument.

Introduction of the instrument

This manual applies to each mode of SGP10xxS series Direct Digital Synthesis (DDS) Signal Generator. In this series, the last two digits "xx" represent the upper limit frequency value (MHz) of each mode.

SGP10xxS series use direct digital synthesis (DDS) technology and FPGA design. With wide voltage power supply (DC9V-DC40V), it can output Sine wave, Square wave (Duty cycle adjustable from 1% to 99%) and Triangle wave (include sawtooth wave). Maximum effective output is greater than 10Vpp with resolution of 0.01Hz (10mHz). Output amplitude and DC offset can be adjusted continuously. It has two sweep functions, linear sweep and logarithmic sweep. Both the sweep range and the sweep time can be set up optionally. Meanwhile, it integrates other multiple functions into one, including synchronized TTL output, exterior frequency measuring and counter function. It has the advantages of convenient operation, high stability of the signal, one-key operation, BNC port output, output amplitude one-key Attenuation, Dual-channel TTL electric level differentially output, Embedded panel mounting structure, easy integration with customer products etc.. It's the ideal instrument for electronic enthusiasts, laboratories, production lines, teaching and scientific researchers. It can also be used as supporting module for industrial equipment. Recently, it has already widely used in teaching instruments and industrial control equipments. It is a highly cost-effective product!

It has excellent technical indexes and function features:

- ◆Compact size, multiple functions, easy to carry.
- ◆Wide voltage DC power supply (DC9V-DC40V).
- ◆Embedded panel mounting structure, easy to integrate with customer products.
- ◆High frequency accuracy: $\pm 5\times 10^{-6}$
- ◆High resolution: 10 mHz
- ◆All range continuously adjustable, digital setting.
- ◆High waveform accuracy: The output waveform synthesis by calculating function.
- ◆One-key controlled signal output.
- ◆3.3V TTL electric level output.
- ◆Several different waveforms: Sine wave, Square wave (Duty cycle adjustable) and Triangle wave (include sawtooth wave).
- ◆Sweep function: Linear sweep, Logarithmic sweep. Starting and stop points can be set optionally.
- ◆Save function: 10 sets of parameters defined by the users can be saved and loaded anytime.
- ◆Operation mode: Button controlled, LCD display, digital setting, knob adjusted continuously.
- ◆Output mode： Standard BNC port output.
- ◆ Highly reliable： Large scale integrated circuit, Surface mounting technology, reliable and durable.
- ◆ Frequency measurement： Frequency of internal / external signal can be measured through built-in 60MHz frequency meter.

Main technology indexes

- **Signal Output function**

Output waveforms	Sine wave, Square wave (Duty cycle adjustable) and Triangle wave (include sawtooth wave)
Output amplitude	≥10Vp-p (signal output, no load)（MAX） About 0.1Vp-p (MIN)
Output impedance	51Ω±10%(signal output)
DC offset	±3V(no load)
Frequency range	0.01Hz ~ 2MHz(SGP1002S) 0.01Hz ~ 5MHz(SGP1005S) 0.01Hz ~ 8MHz(SGP1008S)
Resolution	0.01Hz(10mHz)
Frequency accuracy	$\pm 5\times 10^{-6}$
Frequency Stability	$\pm 2\times 10^{-6}$/3 Hours
Sine wave distortion	≤0.8% (reference frequency is 1kHz)
Triangle linearity	≥98% (0.01Hz~10kHz)
Rise and fall time of square wave	≤100ns
Square Wave Duty range	1%~99%(digital control mode)

- **TTL Output function**

Frequency range	0.01Hz ~ 2MHz (SGP1002S) 0.01Hz ~ 5MHz (SGP1005S) 0.01Hz ~ 8MHz (SGP1008S)
Amplitude	>3Vp-p
Fan Out	>20 TTL loads

- **COUNTER function**

Counter Range	0-4294967295
Frequency Meter Range	1Hz~60MHz
Input Voltage Range	0.5Vp-p~20Vp-p

- **SWEEP function**

Sweep mode	Linear sweep, Logarithmic sweep
Frequency setting range	0.01Hz ~ 2MHz (SGP1002S) 0.01Hz ~ 5MHz (SGP1005S) 0.01Hz ~ 8MHz (SGP1008S)
Sweep range	**f_{M1} (pre-set) to f_{M2} (pre-set)**
Sweep time	1s~99s

- **Others**

Display	LCD1602 in English
Save and Load Parameter	M0-M9(M0: default load)
Size	135mm (Length)×65 mm(Width)×35mm(Height)
Buzzer warning tone	Can be turned On/Off by setting
Production technology	Surface mounting technology, large scale integrated

	circuit, reliable and durable
Operation feature	Button-controlled, Knob-adjusted continuously
Conditions requirement	Temp: 0~40℃ Humidity: ＜80%

The function introduction of front panel



Operating Guide

1. Press the button【Menu】 to switch between Frequency adjusting and Function adjusting. The detailed condition (frequency adjusting or function adjusting) displayed after "*"

*F=0010.00000kHz FUNC:WAVE=SINE	F=0010.00000kHz *FUNC:WAVE=SINE

2. As frequency adjusting, pressing the button 【◀】 or 【▶】 to adjust position of cursor, and pressing the button【Confirm】to toggle unit of frequency (Hz，kHz or MHz), and then adjusting the【Main knob】 to set the corresponding value of frequency.

*F=0010.00000kHz FUNC:WAVE=SINE	Step frequency：1 kHz
*F=0010.00000kHz FUNC:WAVE=SINE	Step frequency：100 kHz **etc.**
*F=0010000.00 Hz FUNC:WAVE=SINE	The frequency unit is Hz

*F=0.01000000MHz
FUNC:WAVE=SINE   The frequency unit is MHz

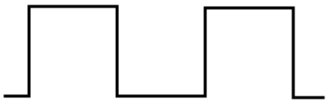
3. As function adjusting, pressing the button 【◀】or【▶】to toggle among "WAVE" ,"DUTY", "COUNTER", "EXT.FREQ", "SWEEP", "SAVE" , "LOAD" .
4. The "WAVE" shows the current wave state. Press the button【Wave】to toggle the current output of waveform among **SINE**, **TRGL** and **SQUR**.

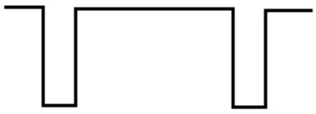
F=0010.00000kHz
*FUNC:WAVE=SINE   Main output of waveform is SINE.

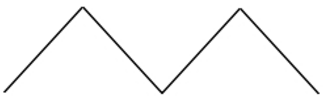
F=0010.00000kHz
*FUNC:WAVE=SQUR   Main output of waveform if SQUR.

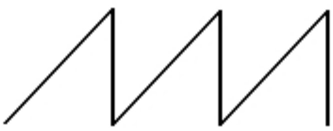
F=0010.00000kHz
*FUNC:WAVE=TRGL   Main output of waveform is TRGL.

5. The "DUTY" means duty cycle. It can be adjusted by rotating the【Main knob】. SQUR adjusted from 1% to 99%, while TRGL adjusted among 50% (standard TRGL), above 50% and below 50% (both are different sawtooth waves). SIN is disabled in this case.

F=0010.00000kHz
*FUNC:DUTY=50% :

(WAVE=SQUR)

F=0010.00000kHz
*FUNC:DUTY=80% :

(WAVE=SQUR)

F=0010.00000kHz
*FUNC:DUTY=50% :

(WAVE=TRGL)

F=0010.00000kHz
*FUNC:DUTY= 51% :

(WAVE=TRGL)

F=0010.00000kHz
*FUNC:DUTY=49% :

(WAVE=TRGL)

6. Press the button 【EXT.FREQ/COUNTER】to switch between COUNTER function and EXT.FREQ function.

(1)、The "COUNTER" means counter function, and the counter values displayed on the screen. Impulse can be inputted from the port【Ext. Input】. Reset it to "0" as pressing the button【Confirm】to recount.

CNTR=1201
*FUNC:COUNTER

（2）、The “EXT.FREQ” means exterior frequency measuring function, which can measure the frequency of input signal from the port【Ext. Input】.

ExtF=10.00kHz
*FUNC:EXT.FREQ

7. Press the button【Save】to save the value of current frequency, waveform and duty cycle into internal storage for loading next time. There are 10 storage positions from M0 to M9, which can be chosen by rotating the【Main knob】. Then press the button 【Confirm】 to save. When “OK” appears on the right corner of the screen, storage is finished. If the current value is saved to “M0” position, the changed value will be loaded when restarted. (Under sweep function state, the starting frequency is defined at M1 and the stop frequency is defined at M2. So if the sweep function need to be run, the frequency values fM1 and fM2 must to be set firstly and make sure the values fM2>fM1)

F=2012.03010kHz
*FUNC:SAVE=0 （Choose storage position）

F=2012.03010kHz
*FUNC:SAVE=0 OK (Save to “0 position” is OK)

8. The “LOAD” is function of loading the parameters of memory. Operation is similar to SAVE.
9. The “TIME” is the function of setting sweep time. It can be set from 1 second to 99 seconds.

F=0010.00000kHz
*FUNC:TIME=10s

10. The “SWEEP” is the function of sweep includes LIN-SWEEP Mode and LOG-SWEEP Mode. The default setting is LIN-SWEEP Mode. You can rotate the 【Main knob】 to switch between these two modes. Then press the button 【Confirm】 to start and press it again to stop. But primarily the starting frequency (fM1) and stop frequency (fM2) need to be set in the “LOAD” function and sweep time need to be set in the “TIME” function.

F=0010.00000kHz
*LIN-SWEEP:STOP

F=0010.00000kHz
*LIN-SWEEP: RUN

F=0010.00000kHz
*LOG-SWEEP: STOP

F=0010.00000kHz
*LOG-SWEEP: RUN

11. TTL output the synchronized TTL wave of the same frequency. (Note: Remove

the front panel and you will find "J6" port on the right of DC Offset Adjust potentiometer. Dual-channel differential TTL electric level can be output through this port.

12. The【AMPL】knob adjusts the amplitude of output signal.
13. The【DC Offset Adjust】knob adjusts the DC offset of output signal.
14. The buzzer function. Each time when you press a button or rotate a knob, an impulse will be generated and the buzzer will beep once. It will beep longer if invalid operation is conducted. The buzzer can be turned off by pressing and holding the button【Menu】and then turning on the power switch in shutdown state if it is noisy. The buzzer can be turned on by repeating above operations.
15. Press down the button【Attenuator】, the output signal will be attenuated by 20dB. Press up the button【Attenuator】, the output signal will not be attenuated.
16. Press the button【Output/Stop】, if "STOP OUTPUT" displayed on the second line of the screen, it means the instrument has stopped output. If something others are displayed, it means the instrument outputs signal normally.

● Safety Notes

1、Before using this instrument, please check if the power supply is normal, to ensure the normal use and personal safety.

2、This instrument must be used in the technical index range.

3、Please do not change the instrument circuit arbitrarily, so as to avoid damaging equipment or endangering the safety.

● Warning and personal injury

Do not apply the product in the safety protection device or emergency stop device, or any other applications that the product failure could result in personal injury, unless there is special purpose or use authorization. Before the installation and use, each parameter of the technical indexes in this manual should be referred to. If this suggestion is not obeyed, death or serious personal injury could be caused. In this condition the company will not be responsible for any compensation of personal injury or death, and all the company managers and employees and auxiliary agents, distributors, other personnel concerned will be released from any claim (including all the costs, expenses, attorney fees etc.) that may result in.

Appendix

Complete set of instrument and auxiliary

SGP10xxS DDS function generator / counter----------------1
DC 12V Power Supply---1
User's manual--1 (PDF Format)